March 5, 1957

25X1

CONFIDENTIAL

25X1

Dear Sir:

We are enclosing three (3) copies each of Progress Reports No. 1 and 2 on Project No. A-100 .

Expenditures on this project during the month of January amounted to $1,439.72, leaving an uncommitted and unexpended balance of $27,573.28.

If you have any questions or comments concerning these reports please call on us.

Sincerely yours,

25X1

C-1153

MAR 1957

6 encls.
RWB:es

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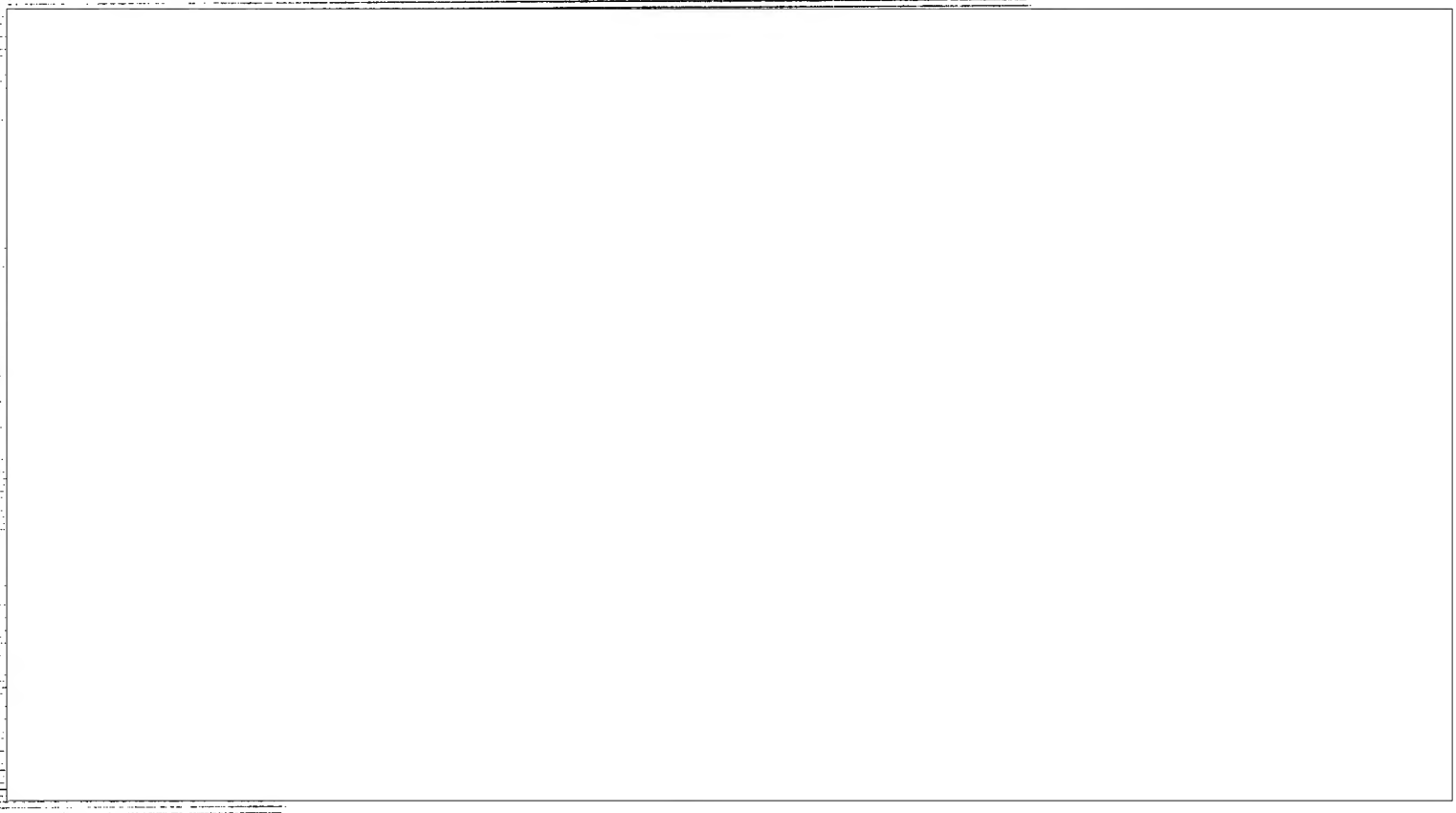

Project A-100

THICKNESS MEASUREMENT OF NON-METALLIC MATERIALS

Progress Report No. 1

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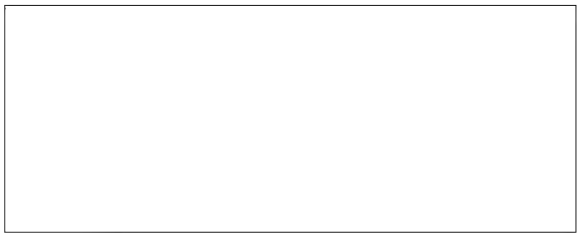
Project No. A-100

THICKNESS MEASUREMENT OF NON-METALLIC MATERIALS

Progress Report No. 1

for



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Copy No. 1

March 4, 1957

Project No. A-100

THICKNESS MEASUREMENT OF NON-METALLIC MATERIALS

I. INTRODUCTION

This is a report of the work done on [redacted] Project No. A-100 during the period of January 15, 1957, to February 1, 1957. The purpose of this project is to study the behavior of sound in concrete and other non-metallic materials with a view to designing and constructing a portable device for measuring the thicknesses of samples of these materials. Earlier work on the problems of this project, performed under Project No. A-075, was reported by this section on November 9, 1956. 25X1

While working under Project A-075, the Acoustics Section ordered and received several barium titanate transducers. Holders for some of these transducers, as well as a pulse generator to excite them, were designed and constructed during this period. Thus, at the beginning of the period covered by this report, we were prepared to examine some of the aspects of the problem of sending an ultrasonic pulse through a concrete block and detecting the pulse reflected from the opposite side of the block.

II. PROGRESS OF WORK

With the original experimental arrangement of pulse, crystal, and crystal holder, it was, in general, difficult to detect the reflected pulse in available specimens of concrete (up to one foot in thickness) because the reflected signal was masked by the remnant oscillation of the crystal from the original pulse. To avoid this, the use of two transducers, one as a transmitter and one as a receiver, was tried. The reflected signal was

again frequently masked in this case by the presence of waves traveling across the surface from the emitter to the receiver. However, in both cases, we have been able to detect at times the presence of the reflected signal. On occasion it has been strong enough to allow a good determination of the travel time and then of the thickness. Moreover, the reflected signal is often strong enough to be visible over the masking signal, even if not strong enough to allow the exact determination of its inception.

III. FUTURE WORK

From the above, it is apparent that we must either reduce the ringing time of the transducer in the case of the combined transmitter-receiver or reduce the effect of surface waves in the case of the separate transmitter and receiver. The ringing time could be reduced either electronically or by damping in the transducer holder. The solution of the problem in the second case would also involve the transducer geometry, with the attempt here being to improve the coupling for plane bulk waves while reducing the coupling for surface waves. During the next month various changes in the present transducer geometry will be made in an attempt to determine the optimum geometry.

Another investigation projected for the future is that on the associated electronic equipment with a particular attempt being made to obtain the pulse from the oscilloscope circuitry, thus reducing the amount of equipment needed.

IV. NOTEBOOK

The work on this project is being recorded in [redacted] Logbook No. C-6516. 25X1

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V. CONTRIBUTING PERSONNEL

Much of the work reported here was done by [redacted] 25X1

[redacted] also spent some time on the project. 25X1

Respectfully submitted, 25X1

[redacted]